

Burlington, Vermont, 11th: Aurora seen through the openings in the clouds from 9 to 11.40 p. m. Streamers were observed in the northwestern sky at 11.15 p. m.

Mobile, Alabama, 11th: Faint aurora visible from 8 to 9 p. m. No waves or streamers were observed. It rose to an altitude of about 20° and converged toward the zenith. A short while before 9 p. m. it began to recede and soon disappeared.

Alpena, Michigan, 13th, from 9 p. m. to 2 a. m. of 14th: Aurora consisting of a diffuse light.

Manitowoc, Wisconsin, 13th: Aurora visible during the evening.

Alpena, Michigan, 14th, 9.30 p. m.: Aurora, consisting of a diffuse light with a few streamers.

Manitowoc, Wisconsin, 14th: Aurora observed during the evening.

Marquette, Michigan, 14th, from 10.35 to 11.30 p. m.: Aurora, with beams reaching an altitude of 45°, illuminating the whole northern sky.

Burlington, Vermont, 19th, from 10 to 11.45 p. m.: Aurora consisting of a dark olive-green light; no prominent features.

Bismark, Dakota, 19th, from 8 to 11 p. m.: Faint auroral light.

Lansing, Michigan, 20th: Aurora during evening.

Hastings, Michigan, 21st: Aurora during evening.

Marquette, Michigan, 21st, 9.45 to 11.10 p. m.: Auroral light extending across the northern heavens.

Escanaba, Michigan, 21st, from 8 to 10.15 p. m.: Diffuse auroral light with a few streamers pointing toward the zenith.

New Corydon, Indiana, 23d, 2 a. m.: Aurora with white segment; altitude 10°, azimuth 65°.

Gardiner, Maine, 25th, at midnight: A flattened auroral arch with dark cloud beneath appeared; at 3.20 a. m., the arch was brighter and extended farther eastward.

New Haven Connecticut, 26th: Dim auroral light discernible in the northern sky at 1 a. m.

Cambridge, Massachusetts, 26th: Auroral light observed at 10:15 p. m.

Gardiner, Maine, 26th: Faint auroral light from 11 p. m. to 12.30 a. m. of the 27th.

THUNDER-STORMS.

Thunder-storms were reported in the various districts on the following dates:

New England, 7th, 14th, 16th, 24th, 28th, 29th, 30th.

Middle Atlantic states, 1st, 5th, 6th, 9th, 10th, 11th, 13th, 14th, 17th, 20th, 21st, 22d, 23d, 24th, 26th, 27th, 28th, 29th, 31st.

South Atlantic states, 4th to 7th, 9th to 12th, 14th to 17th, 25th, 26th, 28th, 29th, 31st.

Florida peninsular, 1st, 2d, 6th, 7th, 8th, 10th, 11th, 15th, 24th, 26th, 27th, 29th.

East Gulf states, 6th to 11th, 13th, 20th, 21st, 27th, 28th, 29th, 31st.

West Gulf states, 2d to 10th, 13th, 20th, 25th, 26th, 27th, 30th, 31st.

Ohio valley and Tennessee, 4th, 13th, 15th, 16th, 25th to 28th, 31st.

Lower lake region, 1st, 4th, 8th, 9th, 10th, 24th, 27th, 28th, 31st.

Upper lake region, 3d, 4th, 6th to 10th, 13th, 18th, 24th, 25th, 27th, 30th.

Upper Mississippi valley, 3d, 4th, 5th, 7th, 8th, 9th, 10th, 19th, 20th, 24th to 28th, 30th, 31st.

Missouri valley, 3d, 4th, 5th, 8th, 16th, 18th, 19th, 23d, 24th, 26th, 29th, 30th, 31st.

Extreme northwest, 4th, 16th, 18th, 31st.

Northern slope, 2d, 3d, 5th, 7th, 15th, 16th, 19th, 26th to 30th.

Middle slope, 1st, 2d, 5th, 6th, 15th to 19th, 24th, 25th, 26th, 29th.

Southern slope, 1st to 6th, 8th, 9th, 16th, 17th, 18th, 21st, 23d to 26th, 28th, 29th, 30th.

Rio Grande valley, 3d, 5th, 6th, 12th, 16th, 17th, 18th, 20th, 24th, 28th, 31st.

Northern plateau, 1st, 2d, 3d, 6th, 10th, 11th, 12th, 16th, 18th, 27th.

Middle plateau, 23d, 24th, 25th, 28th.

Southern plateau, 6th, 7th, 8th, 13th, 17th, 22d, 29th, 30th.

Thunder-storms were also reported from the following stations not included in the districts named above: Portland, Oregon, 2d; Red Bluff, California, 2d; Visalia, California, 2d.

During thunder-storms the following instances of damage by lightning have occurred:

Clay Centre, Kansas, 26th: At Wakefield, sixteen miles southeast of this place, a store was struck, cutting the chimney in halves and melting a number of cans containing fruit.

Little Rock, Arkansas, 4th: A house at this place was struck; the lightning knocked down the chimney and tore off a part of the roof about ten feet square. It passed down a metallic spout and through a barrel full of water, knocked out the bottom of the barrel and entered the ground, making a hole about two feet in diameter and two feet deep. On the ninth, a tree in the state house yard was struck; at the same time a man was made insensible on the street about two hundred yards distant.

Bismarck, Dakota, 31st: Lightning struck and tore out the end of a dwelling. A man, the only occupant of the house, was thrown violently down. Silverware in the house was melted.

Huron, Dakota, 4th: Lightning struck a wind vane, passing from it to the anemometer, and from thence along the wires to the self-register, burning that instrument together with telegraph instruments, switch, and ignited the window curtain. Four distinct explosions occurred within the office, and were heard nearly a square distant. The observer felt a severe shock, which rendered him insensible for several minutes.

At Shelbyville, Kentucky, during a thunder-storm on the night of the 4th, the lightning struck several points in the town. Trees, fences, and houses were more or less damaged; the inmates of one of the houses, had a very narrow escape, being made insensible by the fluid. Several valuable cattle were killed.

TELEGRAPHIC COMMUNICATION INTERRUPTED BY ATMOSPHERIC ELECTRICITY.

Fort McKavett, Texas, 20th, 30th.

Fort Elliott, Texas, 1st, 2d, 6th, 29th.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various districts on the following dates:

New England, 3d, 5th, 6th, 7th, 8th, 9th, 10th, 21st, 22d, 25th, 28th, 30th, 31st.

Middle Atlantic states, 8th, 9th, 22d, 24th, 26th, 28th.

South Atlantic states, 8th, 11th, 19th, 20th, 24th, 31st.

Florida peninsula, 2d, 23d, 29th, 30th.

West Gulf states, 17th, 23d.

Ohio valley and Tennessee, 3d, 4th, 7th, 8th, 9th, 14th, 15th, 19th, 21st, 24th, 26th, 30th.

Lower lake region, 3d, 5th, 6th, 8th, 16th, 17th, 19th, 24th, 26th, 30th.

Upper lake region, 2d, 5th, 6th, 7th, 8th, 14th, 19th, 21st, 24th to 29th.

Upper Mississippi valley, 3d, 6th, 9th, 14th, 18th, 19th, 24th, 26th, 27th, 29th 30th.

Missouri valley, 20th, 25th, 28th, 30th.

Northern slope, 24th, 25th, 31st.

Middle slope, 7th, 9th, 10th, 16th, 21st, 28th.

Northern plateau, 5th, 11th, 21st, 22d, 24th, 30th, 31st.

North Pacific coast region, 21st, 28th, 31st.

Middle Pacific coast region, 4th, 5th, 13th, 17th, 18th, 22d, 23d, 27th.

Solar halos were also reported from the following stations not included in the districts named above: Saint Vincent, Minnesota, 28th; Bismarck, Dakota, 28th; Campo, California, 1st; Carson City, Nevada, 23d; Salt Lake City, 18th, 22d, 23d, 24th, 28th, 31st.

LUNAR HALOS.

Lunar halos have been observed in the various districts on the following dates:

New England, 23d, 24th, 25th, 26th, 31st.

Middle Atlantic states, 2d, 3d, 5th, 23d, 24th, 25th, 27th to 31st.

South Atlantic states, 1st, 4th, 28th, 30th, 31st.

Florida peninsula, 23d, 24th, 31st.

East Gulf states, 4th, 24th, 26th, 27th, 58th, 30th, 31st.

West Gulf states, 2d, 3d, 24th to 30th.

Ohio valley and Tennessee, 1st, 2d, 25th, 27th, 30th.

Lower lake region, 5th, 6th, 15th, 24th, 25th, 26th, 30th.

Upper lake region, 22d, 25th, 26th, 29th.

Upper Mississippi valley, 2d, 22d, 25th, 26th, 27th, 29th.

Missouri valley, 3d, 23d, 24th, 26th to 30th.

Northern slope, 24th, 25th, 27th, 28th.

Middle slope, 5th, 22d, 23d, 30th.

North Pacific coast region, 21st, 26th, 28th, 31st.

Middle Pacific coast region, 4th, 27th.

South Pacific coast region, 1st, 2d, 3d, 25th, 26th.

Lunar halos were also reported from the following stations not included in the districts named above: Stockton, Texas, 22d, 23d, 24th; Fort Yates, Dakota, 28th; Uvalde, Texas, 26th.

MIRAGE.

Indianola, Texas, 1st, 11th, 13th, 22d.

Alexandria, Dakota, 1st, 3d, 14th, 15th, 24th, 28th, 29th.

Northfield, Minnesota, 28th.

MISCELLANEOUS PHENOMENA.

SUNSETS.

The characteristics of the sky as indicative of fair or foul weather for the succeeding twenty-four hours, have been observed at all Signal Service stations. Reports from 189 stations show 5,731 observations to have been made, of which 28 were reported doubtful; of the remainder, 4,902, or 85.9 per cent., were followed by the expected weather.

SUN SPOTS.

The following record of observations has been forwarded by Mr. D. P. Todd, Director of the Lawrence Observatory, Amherst, Mass.:

DATE— May, 1882.	No. of new		Disappear'd by solar rotation.		Reappear'd by solar rotation.		Total No. visible.		REMARKS.
	Grps	Spots	Grps	Spots	Grps	Spots	Grps	Spots	
1, 4 p. m.	2	4	0	0	1	2	3	12	
2, 2 p. m.	0	8	0	0	0	5	3	20†	
3, 2 p. m.	0	3	1	3	0	3	3	20†	
4, 4 p. m.	1	3	1	3	1	1	3	18	
8, 2 p. m.	3	35†	0	0	0	0	5	55†	
10, 2 p. m.	1	5	0	3	1	5	6	55†	
17, 2 p. m.	0	0	0	0	0	0	4	90†	Many of the spots small.
18, 3 p. m.	0	0	0	2	0	0	4	90†	Many of the spots small.
19, 2 p. m.	0	0	1	2	0	0	3	90†	Many of the spots small.
20, 3 p. m.	1	5	0	0	0	0	4	90†	Many of the spots small.
22, 3 p. m.	0	0	1	25†	0	0	2	35†	
23, 2 p. m.	0	0	0	15†	0	0	2	20†	
24, 4 p. m.	1	2	1	15†	1	2	2	10	
25, 2 p. m.	0	0	0	4	0	0	2	6	
26, 2 p. m.	0	0	1	3	0	0	1	3	
27, 2 p. m.	0	0	0	0	0	0	1	3	
29, 6 p. m.	2	3	0	0	2	3	3	5	
30, 2 p. m.	0	0	0	0	0	0	3	4	
31, 3 p. m.	0	2	0	0	0	0	3	6	

†Approximated. Faculae were seen at the time of every observation.

Mr. William Dawson, at Spiceland, Indiana, reports: 1st, three groups, twenty-two spots; one large spot on the the east edge; 7th, five groups, sixty spots, mostly in northeast quadrant; one large spot north of centre; 10th, seven groups,

seventy-two spots; condensed group on east edge; 15th, five groups, one hundred and twenty-five spots; three very large groups in the eastern hemisphere; one visible to the unassisted eye; 17th, seven groups, one hundred and fifty spots; one visible to the unassisted eye; 20th, four groups, seventy-five spots; 22d, two groups, twelve spots; 24th, two groups, ten spots, one spot very close to east edge; 26th, two groups, four spots; one spot very close to west edge and three spots near east edge.

Mr. David Trowbridge, at Waterburgh, New York reports: 2d, two groups, two spots; one large spot just appeared by rotation; 3d, five groups, eleven spots; two groups appeared by rotation and one arisen; faculae in east; 5th, four groups, six spots; 6th, three groups, seven spots; 7th, seven groups, nine spots; one new group appeared by rotation; 8th, four groups, thirteen spots; 10th, four groups, nine spots; 15th, four groups, seventeen spots; the large group that disappeared on 26th of April has reappeared, and is visible without the telescope; 16th, five groups, twenty-eight spots, one new faint group near the centre of the disk; 17th, three groups, twenty-four spots; the large group is breaking up into smaller spots, but is still visible without telescope; faculae generally visible; 10th, three groups, twenty-seven spots; 19th, three groups, fifteen spots; 20th, three groups, eighteen spots; 23d, two groups, three spots; the large group visible as two large spots; 24th, one group, two spots; one group has disappeared by rotation; 26th, one group, one spot; the large group has disappeared by rotation, and a new one has appeared by rotation; 20th, two groups, two spots; one new group has appeared by rotation; 30th, three groups, three spots; one faint group has arisen.

Mr. H. D. Govey, at North Lewisburg, Ohio, reports: sun spots were observed on all clear days during the month; they were largest and most active from the 8th, to the 16th, and smallest at the beginning and close of the month.

The following record of observation has been forwarded by Mr. A. G. Bender, Sacramento, California.

DATE— May, 1882.	No. of new		Disappear'd by rotation.		Reappear'd by rotation.		Total No. of		REMARKS.
	Grps	Spots	Grps	Spots	Grps	Spots	Grps	Spots	
1, 3 30 p. m.	1	4	0	0	1	1	3	12	[spots disappeared.
2, 2 " "	1	5	0	0	0	0	3	12	One group of four
4, " "	1	2	0	0	0	0	3	7	Group which app'd
5, " "	1	3	0	0	0	0	4	10	30th ult, disapp'd.
6, " "	1	1	0	0	0	0	4	12*	Perhaps re-app'd.
8, " "	1	1	0	0	0	0	5	12*	New spots.
10, " "	1	1	0	0	0	0	5	10*	Changes in spots (size
11, " "	1	1	0	0	0	0	4	30*	and position.)
12, " "	1	5	0	0	0	0	6	35*	One group disappear'd
14, 4 " "	1	1	1	1	0	0	5	35*	
15, " "	1	1	1	5	1	5*	4	35*	One group of one spot
16, " "	1	1	1	5	1	5*	4	35*	disapp'd. Much
21, " "	1	1	1	5	1	5*	4	35*	change in groups.
22, " "	1	1	1	5	1	5*	4	20*	Two of these groups
23, " "	1	1	1	5	1	5*	4	20*	may be but one.
25, " "	1	1	1	5	1	5*	4	20*	Portion of groups dis-
26, " "	1	1	1	5	1	5*	4	20*	app'd by rotation.
29, " "	1	1	1	5	1	5*	4	20*	Remainder disapp'd
31, " "	1	1	1	5	1	5*	4	20*	by rotation.
31, " "	1	1	1	5	1	5*	4	20*	Perhaps only one gr'up
31, " "	1	1	1	5	1	5*	4	20*	of one large and five
31, " "	1	1	1	5	1	5*	4	20*	small spots.
31, " "	1	1	1	5	1	5*	4	20*	Part of group disapp'd
31, " "	1	1	1	5	1	5*	4	20*	by rotation.
31, " "	1	1	1	5	1	5*	4	20*	Rest of group disapp'd
31, " "	1	1	1	5	1	5*	4	20*	by rotation, and also
31, " "	1	1	1	5	1	5*	4	20*	the large spot.

24th cloudy; otherwise, on omitted days, only the changes due to solar rotation were observed.

*Estimated.

METEORS.

Yuma, Arizona, 14th, 20th.

Charleston, Illinois, 16th

New Corydon, Indiana, 9th, 16th.

Vevay, Indiana, 16th, 23d.

Clinton, Iowa, 22, at 2.30 a. m. A large and brilliant meteor appeared in the heavens at a point a little south of west and at an elevation of 50°. It passed rapidly downward, and